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## Original Article

## The effectiveness of a serious game to enhance empathy for care workers for people with disabilities: A parallel randomized controlled trial

P.S. Sterkenburg, Ph.D. <sup>a, b, \*</sup>, V.S. Vacaru, M.Sc., Ph.D. Candidate. <sup>c</sup><sup>a</sup> Bartiméus, Doorn, The Netherlands<sup>b</sup> Department of Clinical Child and Family Studies, Vrije Universiteit Amsterdam, The Netherlands & Amsterdam Public Health Research Institute (APH), Amsterdam, The Netherlands<sup>c</sup> Donders Institute for Brain, Cognition and Behaviour, Radboud University, Nijmegen, The Netherlands

## A B S T R A C T

## Keywords:

Empathy  
Personal distress  
Serious game  
Care workers  
Disability

**Background:** Empathic care is fundamental in healthcare settings and is associated to several positive outcomes for care workers (i.e. burnout, compassion satisfaction) and patients (i.e. therapeutic alliance, trust, wellbeing). Yet, studies showed a decrease in empathy in care workers, which is argued to be a product of personal distress. Thus, interventions should aim at enhancing empathy in care workers working for vulnerable populations to ensure optimal client-carer relationships.

**Objectives:** The current study investigates the effectiveness of the serious game “The world of EMPA” in enhancing empathy in care workers for people with disabilities, and tests the effect of personal distress on empathy change post intervention.

**Methods:** We conducted a superiority parallel randomized controlled trial (RCT) and tested 224 participants in two conditions: the experimental group (n = 111) played a serious game and the control group (n = 113) read a digital information package about disabilities. Participants were assessed on empathy and personal distress prior to and after the intervention.

**Results:** Main results showed that the serious game did not significantly enhance empathy in care workers, whereas reading a digital information package yield a significant decrease in empathy. Exploratory analysis showed that the serious game decreased significantly personal distress in care-workers.

**Conclusions:** This study showed that while the serious game “The world of EMPA” did not enhance empathy, it resulted in a decrease in personal distress in care workers for people with disabilities. Further evidence should corroborate these findings to unveil the mechanisms of this intervention and the long-term effects on personal distress.

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Empathy lies at the core of patient-carer relationships. The benefits of empathy in healthcare settings are three-fold. First, empathic relationships are fundamental for the establishment of a strong therapeutic alliance<sup>1,2</sup> as well as therapeutic adherence.<sup>3</sup> Second, empathic care has been reported to result in better treatment outcomes,<sup>4</sup> patient and staff wellbeing,<sup>5</sup> patient satisfaction,

and trust.<sup>6</sup> Finally, empathy among care workers has also been associated with a reduction of burnout symptoms<sup>7</sup> and higher compassion satisfaction,<sup>8</sup> defined as positive feelings emerging from a sense of achievement in work.<sup>9,10</sup> A handful of studies show that care workers often fail to deliver empathic care despite these benefits.<sup>11–14</sup> Therefore, it is vital to understand the causes of empathic decline among care workers and address it through appropriate intervention.

Empathy is expected in the care worker population and likely represents one of the motivational drives for pursuing a healthcare career. To elucidate the possible causes of empathy decline in this

\* Corresponding author. Vrije Universiteit Amsterdam/FGb, Department of Clinical Child and Family Studies, Van der Boechorststraat 1, 1081 BT Amsterdam, The Netherlands.

E-mail address: [p.s.sterkenburg@vu.nl](mailto:p.s.sterkenburg@vu.nl) (P.S. Sterkenburg).

population, the empathy construct must be operationalized into its sub-constructs. Empathy is a multidimensional construct with intersecting affective and cognitive components<sup>15</sup> and encompasses a variety of empathic behavioral responses, based on inter-individual differences<sup>16</sup> as well as dispositional states.<sup>16</sup> An empathic response builds upon an understanding of the situation and the thoughts and feelings of others (*cognitive empathy*) as well as the ability to resonate subjectively with the feelings of others and respond sensitively to the situation (*affective empathy*).<sup>17</sup> Importantly, the empathic behavioral response to another person's suffering that arises from affective empathy is divided into other- and self-oriented responses, termed *empathic concern* (the other-oriented empathic response, congruent with the feelings of the other person) and *personal distress* (the self-oriented response, typically an aversive negative emotional reaction).<sup>18</sup>

One explanation for reduced empathic responses towards vulnerable patients may be related to personal distress. While other-oriented empathic responses stem from a desire to alleviate another's pain and involve some degree of distinction between the own and other emotional state,<sup>19</sup> self-oriented responses stem from the desire to alleviate one's own anxiety and negative emotional arousal.<sup>20</sup> Several factors may play a role in personal distress. In addition to inter-individual differences (such as poor self-regulation and coping strategies),<sup>21</sup> environmental and stress-related factors (including time constraints and workload)<sup>12,22</sup> have been shown to impact personal distress, resulting in a decline in empathy among medical staff up to 50%.<sup>23</sup> It has also been shown that empathic concern and personal distress are inversely associated with prosocial and helping behaviors.<sup>24–27</sup> These findings, together with those reported by Pollak and colleagues<sup>28</sup> indicate the direct association between care worker empathy and patient satisfaction, and reveal a major challenge to be addressed within healthcare settings.

### *Caring for people with disabilities*

Previous studies suggest that vulnerable patients, such as people with permanent disabling conditions and their familiars, are affected by negative attitudes, stigma, and lack of communication within healthcare settings.<sup>29,30</sup> Disability is defined as an impairing condition present from birth or acquired during the lifetime that can be physical, cognitive, developmental, intellectual, or a combination of these domains, and may lead to activity limitations and restrictions (such as communication, mobility, self-care, and participation in domestic, community, social and civic life).<sup>31</sup> Accordingly, disability it is not merely a health problem, but a dynamic and complex interplay between one's physical impairment and environmental and societal challenges.<sup>32</sup> Individuals with disabilities encounter daily barriers, not simply from the physical environment (such as wheelchair access), but also institutional and organizational barriers that hinder access to services.<sup>33</sup> Empathy training has increasingly been included in curricula for young trainees and professionals to tackle empathy decline in care workers and in turn to reduce negative attitudes and low patient satisfaction.<sup>5,13,34,35</sup> A recent systematic review of studies investigating empathy change among care workers<sup>36</sup> and a meta-analysis of randomized controlled trials assessing the efficacy of empathy training<sup>37</sup> both concluded that empathy can be effectively targeted, yet more rigorous studies with larger sample sizes and different trainee targets must be conducted. Here we investigate a novel type of empathy intervention, a serious game for care workers for persons with disabilities living in care group homes, with a large sample size and a parallel control group.

### *Training empathy for disability care workers: the effectiveness of a serious game*

Serious games have received considerable attention over the past years as educational and training tools in health care.<sup>38–42</sup> Actively engaging in a serious game, compared to passively watching it or reading a text, has been shown to enhance role-taking and willingness to help.<sup>43</sup> The serious game “The World of EMPA”<sup>44</sup> (<http://www.theworldofempa.org/welcome.php>) was developed as a training tool to enhance empathy in care workers working for people with disabilities. The game graphically illustrates several episodes involving people with disabilities and their caregivers. There are a number of questions requiring active input from the player included with the presentation of each episode, and the player must take the role of the caregiver and choose the most sensitive and empathic response for the given circumstance. The challenge and novelty of “The World of EMPA” is the inclusion of the context in which the episode occurs (i.e. by the beach, in a park, in interaction with one or more people) in addition to the disability and the dyadic interaction between the individual with disability and the caregiver. Actively and virtually engaging in the game represents an efficient way for caregivers to re-engage in circumstances requiring empathy and provides them with the opportunity to act in a safe environment. Care workers are prompted to identify with the caregivers in the game and to respond to questions as if he or she were the actor in the specific circumstance. Correct responses are immediately rewarded with points and congratulations, while incorrect responses receive an opportunity for change and additional explanation of the correct answer. This environment is unique in that it gives immediate feedback along with a sense of reward and achievement for the caretaking, which could be delayed or invisible in real life situations. This sense of accomplishment and success may enhance compassion satisfaction in care workers and in turn enhance their capacity for empathy and lower personal distress.

### *Current study*

The main objective of this parallel-randomized controlled trial (RCT) is to investigate the effectiveness of the serious game “The World of EMPA” for enhancement of empathy in care workers for persons with disabilities, compared reading a text about disabilities. The second objective is to investigate the effect of personal distress on the effectiveness of the intervention. We will test the following hypotheses to address these research questions: (a) playing the game “The World of EMPA” increases empathy from pre-test to post-test, compared to reading a text about disabilities; (b) the change in empathy from pre-to post-test in the experimental condition is influenced by personal distress.

## **Methods**

### *Study design*

This study is a superiority parallel RCT with two conditions. One group received the experimental intervention, consisting of playing the serious game “The World of EMPA” and the second group received the control intervention, consisting of reading a digital information package on disability entitled “Mutual Solidarity”.<sup>45</sup> The outcomes were evaluated at pre-test (before the intervention) and post-test (immediately following the intervention). The trial was conducted in three institutions, two Dutch national governmental organizations specializing in care for people with visual, auditory, and/or intellectual disabilities, and one Dutch public university. The trial was approved by Policy Advisors of the

participating organizations.

### Procedure and randomization

Care workers were invited via letters to participate in the study and were notified that they could take part during working shifts. Upon agreement to participate, the participants were seated in front of a laptop and were instructed to follow the computer-based instructions. The experimenter had no further role in the intervention session. Participants were first asked to give informed consent and then to fill out a demographic questionnaire and two questionnaires measuring empathy and personal distress, respectively. Upon completion of the pre-test phase, participants were automatically randomized via a computerized random assignment to one of the two conditions, based on the Mersenne Twister pseudorandom number generator (PRNG)<sup>46</sup>: the experimental condition, consisting of playing the serious game “The World of EMPA” and the control condition, consisting of reading a digital information package on disability entitled “Mutual Solidarity”. The automatic computer-based randomization was implemented in the programming script of the experiment, resulting in the concealed allocation of the participants into one of the two intervention arms. The researcher was blind to condition once participants started the computer program. The participants were also unaware whether the condition they were allocated to was the experimental or control condition. The allocation ratio resulted in the assignment of approximately 50% of the participants to each condition. The intervention duration was approximately 20 min and was followed by the post-test assessment, performed by repeating the questionnaires measuring empathy and personal distress. The researchers coding and analysing the data were blind to the randomization and interventions.

### Study participants

Two hundred and fifty invitations were sent, a total of 224 care workers working with people with disabilities were recruited, and 223 completed the study (The CONSORT flow diagram is presented in Fig. 1). The disabilities of the people under the caseload of the participants in this study included blindness, intellectual

impairments, and auditory impairments, with a broad range of severity from mild to severe disability. The demographics of the participants allocated to each group are summarized in Table 1. No significant differences emerged between the two groups with regard to gender, age, organization and education level.

### Primary outcome measures

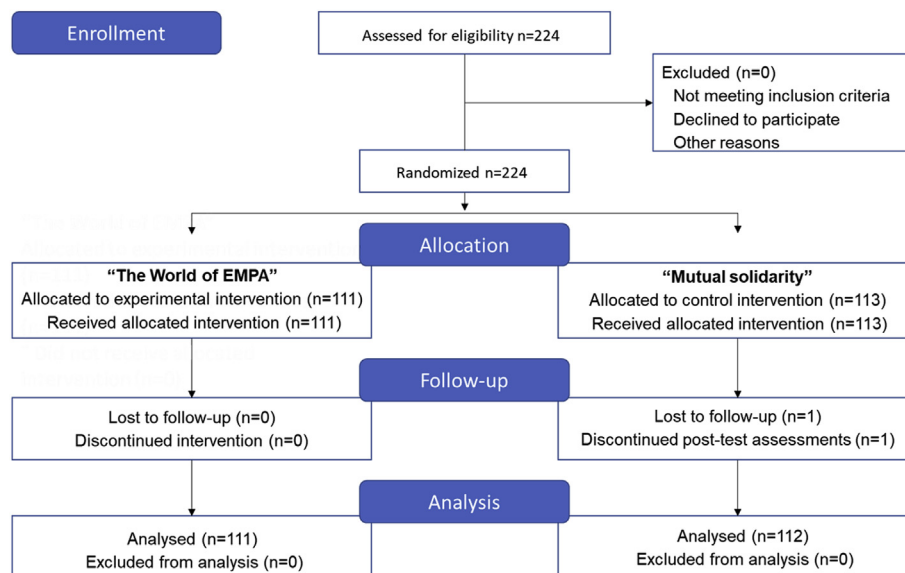
#### Empathy

Empathy was measured using the *Empathy Quotient* (EQ).<sup>47</sup> The EQ is a self-report questionnaire measuring empathic abilities with a 4-point Likert scale on which participants expressed the extent to which they agree with a statement (fully agree, partly agree, partly disagree, fully disagree). One example of a statement is ‘I can sense when someone wants to take part in a conversation’ or ‘I sense when I

**Table 1**  
Characteristics of the study population (n = 214).

	Total 214 (%)	Control 113 (%)	Experimental 111 (%)
<b>Age (years)</b>			
18–40	120 (58%)	58 (51.3%)	66 (59.5%)
>41	94 (42%)	55 (48.7%)	45 (40.5%)
<b>Gender</b>			
Males	26 (12%)	12 (10.6%)	14 (12.6%)
Females	198 (88%)	101 (89.4%)	97 (87.4%)
<b>Education</b>			
MBO	104 (46%)	55 (48.7%)	49 (44.1%)
HBO	73 (33%)	38 (33.6%)	35 (31.5%)
WO	47 (21%)	20 (17.7%)	27 (24.3%)
<b>Ethnicity</b>			
Europeans	113 (97%)	109 (96.5%)	108 (97.3%)
Asians	2 (1%)	1 (0.9%)	1 (0.9%)
Africans	3 (1%)	2 (1.8%)	1 (0.9%)
Latin Americans	2 (1%)	1 (0.9%)	1 (0.9%)
<b>Organization</b>			
Institution 1	71 (32%)	29 (25.7%)	42 (37.8%)
Institution 2	119 (53%)	69 (61.1%)	50 (45%)
Institution 3	34 (15%)	15 (13.3%)	19 (17.1%)

Notes. MBO = Middle level applied education, HBO = Universities of applied sciences, WO = Research Universities; Organization 1 = care facility for persons with visual-and-intellectual disability, Organization 2 = care facility for persons with intellectual disability, Organization 3 = public University.



**Fig. 1.** Flowchart of participants in the study: the experimental group was allocated to play the serious game “The world of EMPA” and the control group was allocated to read the information package “Mutual solidarity”.

interrupt, even when the other person doesn't tell me' We used the short version of the EQ scale, which includes 40 items<sup>48</sup> and gives a total score ranging from 0 to 80. An empathic response was scored with 1 or 2 points depending on the strength of agreement, and the least empathic response scored 0. A score between 0 and 32 signifies a low understanding of the feelings of others and less appropriate responses to those feelings; a score between 33 and 52 indicates average empathic ability, a score between 53 and 63 suggests above average empathic ability, and a score between 64 and 80 indicates a high capacity to understand the feelings of others and to respond in a sensitive manner. This measure had high internal consistency, with a Cronbach's alpha coefficient of 0.823 at pre-test and 0.862 at post-test. The test-retest reliability score was 0.892, and the psychometric properties in our sample are in line with those in previous studies.<sup>49,50</sup>

### Personal distress

Personal distress was measured using the "Interpersonal Reactivity Index" (IRI).<sup>51,52</sup> The IRI is a multidimensional self-report questionnaire, consisting of 4 subscales with 28 total items rated on a 5-point Likert scale (ranging from 0: "does not describe me well" to 4: "describes me very well"). The *fantasy* subscale (FS) assesses the tendency to take the perspective of another person in a fictive situation, such as when reading a book or watching a film. An example item from the FS subscale is "I really get involved with the feelings of a character in a novel". The *perspective taking* subscale (PT) studies the capacity to determine the psychological point of view of another person. An example item from the PT subscale is "When I'm upset at someone, I usually try to 'put myself in his shoes' for a while". The *empathic involvement* subscale (EC) studies feelings of compassion and sympathy for others. An example item from the EC subscale is "I often have tender, concerned feelings for people less fortunate than me". A high score on these subscales indicates a higher capacity to empathize. The fourth subscale is *personal distress* (PD), which assesses the tendency to feel personal distress defined as anxiety and unease in response to the pain or emotional distress of others. An example item from the PD subscale is "When I see someone who badly needs help in an emergency, I go to pieces". A higher score on the PD subscale suggests a lower capacity to empathize with others.<sup>53</sup> PD reflects a "self-oriented" form of empathy, in contrast to the "other-oriented" form reflected by EC. At pre-test, internal consistency analyses yielded satisfactory Cronbach's alpha coefficients of 0.76, 0.66, 0.62, and 0.68 for FS, PT, EC, and PD, respectively, and Cronbach's alpha coefficients at post-test were 0.79, 0.73, 0.67, and 0.79 for FS, PT, EC, and PD, respectively. Test-retest Pearson coefficients yielded high scores of 0.89, 0.78, 0.77, and 0.88 for FS, PT, EC, and PD.

### Interventions

#### Experimental group: "The World of EMPA"

In the experimental group, the intervention consisted of playing a computer-based serious game, aimed towards enhancing empathy towards people with disabilities. "The World of EMPA"<sup>44</sup> illustrates characters with several types of disability: a boy with a visual impairment, a girl with an intellectual disability, a girl with multiple disabilities, and a father, mother, baby, and a boy without disability. The game is divided into six levels, in which players have to respond to several multiple-choice questions about various illustrated situations. To respond successfully, the participant must take the perspective of one of the characters in the story and imagine what the most appropriate behavioral or cognitive approach would be and how they would react. Points are awarded for sensitive empathic responses to the illustrated situation, and a

second chance to answer the question and more explanations of the correct answer are provided when an answer other than the most appropriate empathic response to the given situation is selected. The game contains audio and visual cues to illustrate the situation (such as a crying baby that stops upon correct response). Participants receive a report with their empathy score (low, medium, high) and a certificate of participation upon completion of the game.

#### Control group: "mutual solidarity"

A digital information package was provided as the intervention for the caregivers in the control group. The rationale for choosing a reading intervention as the control was based on the fact that most caregivers working with people with disabilities most likely read some form of information about disability at least once, therefore we controlled for the information content by providing the control group with a specific reading material, and ensured that all participants read it. The reading material began by describing social-emotional and cognitive development from infancy to childhood<sup>54,55</sup> and the nature of the attachment relationship that the child forms with the primary caregiver.<sup>56</sup> The material then describes the importance of sensitive secure attachment for individuals with disability for the prevention of behavioral problems<sup>57</sup> along with case examples including an adult blind man with intellectual difficulties and a boy with intellectual and auditory impairments. These cases are used to illustrate the importance of a sensitive, empathic attachment relationship between caregiver and client. This digital information package was developed by Sterkenburg and colleagues<sup>45</sup> and can be found online. The control group also received the serious game intervention upon completion of all the post-test assessments.

### Statistical analysis

Data were analyzed with IBM SPSS Statistics 22.<sup>58</sup> Descriptive statistics of the variables in the study are summarized in Table 2. We conducted independent-samples t-tests to verify that the randomization successfully divided the participants into two subsamples with no baseline differences in empathy and personal distress prior to testing our main hypothesis. We performed a  $2 \times 2$  repeated measures ANOVA with Time (pre-test, post-test) and Condition (experimental, control) to investigate whether the serious game fosters an increase in empathy score from baseline to post-test relative to the control group, and regression analysis was performed to examine whether personal distress influences the degree of change in empathy. Linear regression analysis was performed to test the prediction of personal distress on empathy scores at post-test while statistically controlling for empathy scores at pre-test. Post-hoc analyses were performed separately for the experimental and the control group to investigate the effect of personal distress on empathy if this analysis lead to a significant effect.

### Results

#### Does the serious game 'The World of EMPA' lead to increased empathy toward people with disability?

An Independent-samples t-test showed no significant differences in baseline empathy ( $t(222) = -1.27, p = .203, N = 223$ ) or personal distress ( $t(222) = .282, p = .778, N = 223$ ), and a repeated-measures ANOVA showed a significant main effect of condition ( $F(1,221) = 4.0, p = .046, \eta^2 = .01$ ) as well as a significant interaction between time and condition ( $F(1,221) = 5.54, p = .019$ ; partial  $\eta^2 = .02$ ). We found no main effect of time. Post-hoc analyses of



**Table 2**  
Means and standard deviations of the study variables.

	Experimental group (M, SD)	Control group (M, SD)
Empathy pre-test	49.84 (9.28)	48.36 (8.29)
Empathy post-test	50.01 (10.63)	46.88 (8.51)
Personal distress pre-test	17.60 (4.57)	17.76 (4.25)
Personal distress post-test	17.07 (5.13)	17.35 (4.54)

Notes. Empathy and personal distress were assessed prior to the intervention (pre-test) and after the intervention (post-test).

paired samples *t*-tests showed a non-significant difference from pre-to post-test in the experimental group ( $t(110) = .42, p = .674, N = 111$ ) and a significant decrease in empathy from pre-to post-test in the control group ( $t(111) = -3.30, p = .001, N = 112$ ).

#### *Does personal distress affect the degree of empathy change following intervention?*

Regression analyses indicated that personal distress predicted empathy at post-test, while controlling for empathy at pre-test ( $\beta = -.18, t(222) = -2.22, p = .027$ ). The analysis was then performed separately for the two groups. Personal distress significantly predicted change in empathy in the experimental group ( $\beta = -.33, t(110) = -2.01, p = .046$ ), but not in the control group ( $\beta = -.17, t(111) = -.95, p = .340$ ).

#### *Exploratory analyses*

We performed additional analyses to explore the potential change in personal distress following the intervention in the experimental and control groups. A paired-sample *t*-test showed that personal distress significantly decreased in the experimental condition ( $t(110) = 2.022, p = .046, N = 111$ ), but not in the control ( $t(111) = 1.768, p = .08, N = 112$ ).

#### **Discussion**

Empathy decline in healthcare professionals is a seemingly robust finding in the literature.<sup>12</sup> A recent meta-analysis<sup>37</sup> has reported that empathy can be trained effectively, but the effectiveness of these interventions was associated with several factors including the type of assessment or type of trainees. In this study we investigated the effectiveness of an intervention specifically aimed at enhancing empathy in care workers for people with disabilities. In light of the recent success of serious games for health training and educational purposes,<sup>38,42</sup> a serious game presenting a virtual environment including several disability cases was developed to engage care workers in empathic understanding and responding.<sup>44</sup> We tested the effectiveness of the serious game “The World of EMPA”<sup>44</sup> to enhance empathy in care workers for people with disabilities in this parallel randomized controlled trial. The control group read a digital information package while the experimental group played the serious game,<sup>45</sup> and empathy and personal distress were assessed before and after the intervention.

We found a significant interaction between condition (experimental vs. control) and empathy at pre- and post-test. Notably, an inverse trend in empathy change from pre-to post-test emerged, in which the experimental group showed a small but non-significant increase in empathy while the control group showed a statistically significant decrease in empathy at post-test. Personal distress predicted the change in empathy in the experimental group, but not in the control group, and exploratory analyses demonstrated that personal distress decreased significantly in the experimental group, but not in the control group, further corroborating these findings.

Contrary to our hypothesis, these findings suggest that actively engaging in the serious game does not lead to a significant change in empathy, but is associated with a significant decrease in personal distress. It is possible that the healthcare professionals in our study already presented the level of empathy addressed in the serious game intervention, such that playing the game did not further increase their empathy significantly. The significant inverse association between personal distress and the change in empathy in the experimental group is notable in this regard. We found that playing the serious game resulted in a significant decrease in personal distress, suggesting the hypothesis that this serious game may actually address personal distress, rather than empathy. The design of the game encouraged participants to act within a safe environment and incorporated examples of disabilities and case scenarios, but also required the player to take the perspective of the caregiver and determine the best behavioral empathic approach for the specific circumstance. Players also received positive rewards for correct answers and were given a second chance to respond, if the answer was not correct, and explanations of the answers were included. Active engagement in the game represents an opportunity to acquire a sense of agency in dealing with challenging situations and to force empathic understanding of those situations. Therefore, the confidence of being able to act in such environment and the chance to change the response when it was not the most appropriate is likely to reduce personal distress. These results are in line with a similar intervention design comparing the effectiveness of a serious game to either passively watching the game or reading text for enhancing perspective taking and helping behaviour, which showed the importance of active engagement in the game.<sup>43</sup> We note that the control group receiving reading material showed a significant decrease in empathy. A possible explanation for this negative effect could be related to the level of emotional involvement. A series of studies have shown that low transportation during the moment of reading leads to a decrease in empathy in the readers.<sup>59</sup> It is possible that passively reading stories may not result in identification with the character, leading to disengagement from the story and the elicited emotions, and the adoption of a self-oriented response aimed at lowering one's own distress and anxiety.<sup>60</sup>

There are several limitations to this study. First, the control group received an information package about disability commonly used in this type organization. We could not control who read it given that general information packages are available to all caregivers at any time, thus this became our control condition. This limitation could be addressed by conducting a multi-site RCT in which each intervention can be compared to a control group receiving no standardized intervention. Second, it was a very short intervention of 20 minutes and the outcome measures in our study were assessed within a single session pre- and post-intervention. These findings reflect the immediate effects of this short interventions, however an extended intervention and follow-up measures should be conducted in order to assess the long-term effectiveness of the interventions. These findings support the added value of serious gaming and its effectiveness in lowering personal distress for the purposes of this study, despite the absence

of a change in empathy after a single session. We suggest that the effectiveness of this serious game should be specifically assessed in relation to personal distress during the evaluation of long-term outcomes in a multi-site study.

Our study employed a large sample size and included care workers for people with disabilities. Although it was not statistically significant, the trend towards improved empathy in the experimental group might have clinical relevance benefiting professional healthcare staff. These findings must be further corroborated by future studies taking different subgroups (such as years of experience or training, type of disability) into account.

In conclusion, this RCT showed that the serious game “The World of EMPA” is unlikely to increase empathy in healthcare professionals working with persons with disabilities, but is likely to decrease personal distress. This study also indicates that reading information about disability alone may lead to fewer negative effects on empathy. Further research must explore these effects in detail. Addressing empathy in healthcare settings is crucial for the wellbeing of the staff,<sup>7,8</sup> the patient/client-care worker relationship,<sup>2</sup> patient/client satisfaction, and treatment outcomes.<sup>28</sup>

## Conflicts of interest

The authors have no conflicts of interest to declare.

## Disclosures

PS designed the study and was the coordinator of the study. SV conducted the data-analyses and reported this in the result section. Both PS and SV contributed to the first draft of the paper as well as the final manuscript.

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